

## Introduction

### Baseline Mission Profile:

ELV injection to a 185 km circular LEO

Two-stage lunar stack consisting of a transfer vehicle and lander

### Baseline ELVs:

Delta II 7920

Titan IIS SLV

### Optional Mission Profile:

ELV performs TLI burn

Single-stage lander injected

### Optional ELVs:

Atlas II, IIA, IIS

Titan IIL SLV

## **McDonnell Douglas 7920**

### **Description of Delta II Series ELVs:**

**LOX/RP-1 first stage, RS-270/B or RS-270/C main engine.**

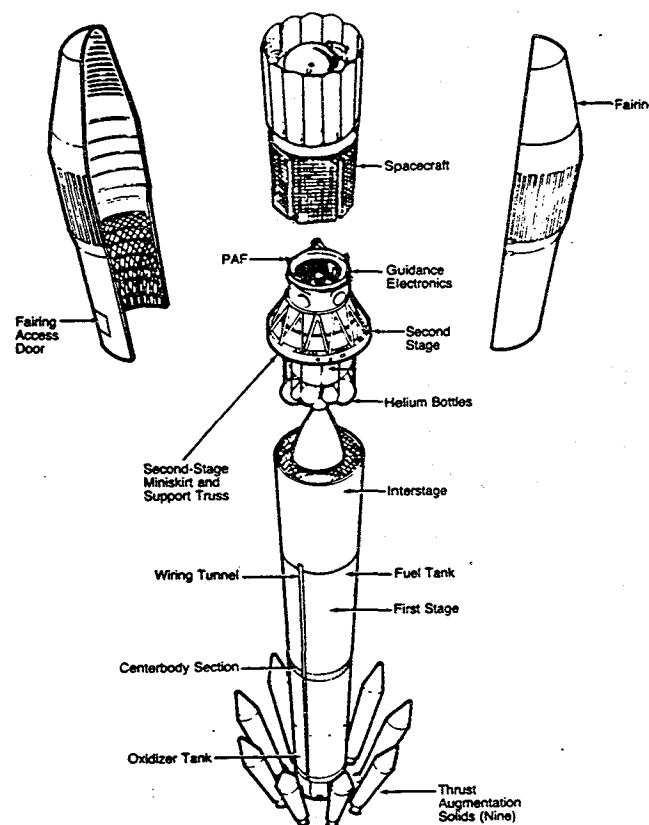
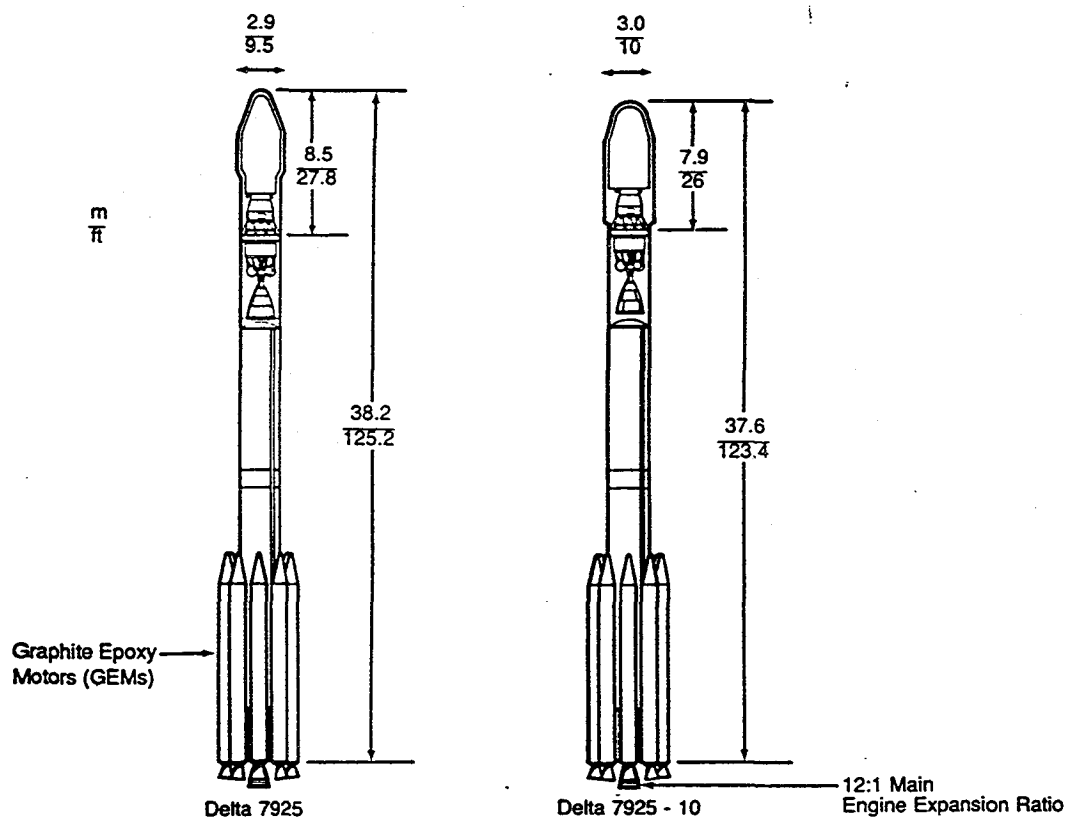
**N2O4/Aerozine-50 second stage, AJ10-118K, avionics for first two stages.**

**Delta II 7920 has 9 GEM strap-ons, 7925 has a STAR-48B upper stage.**

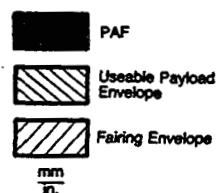
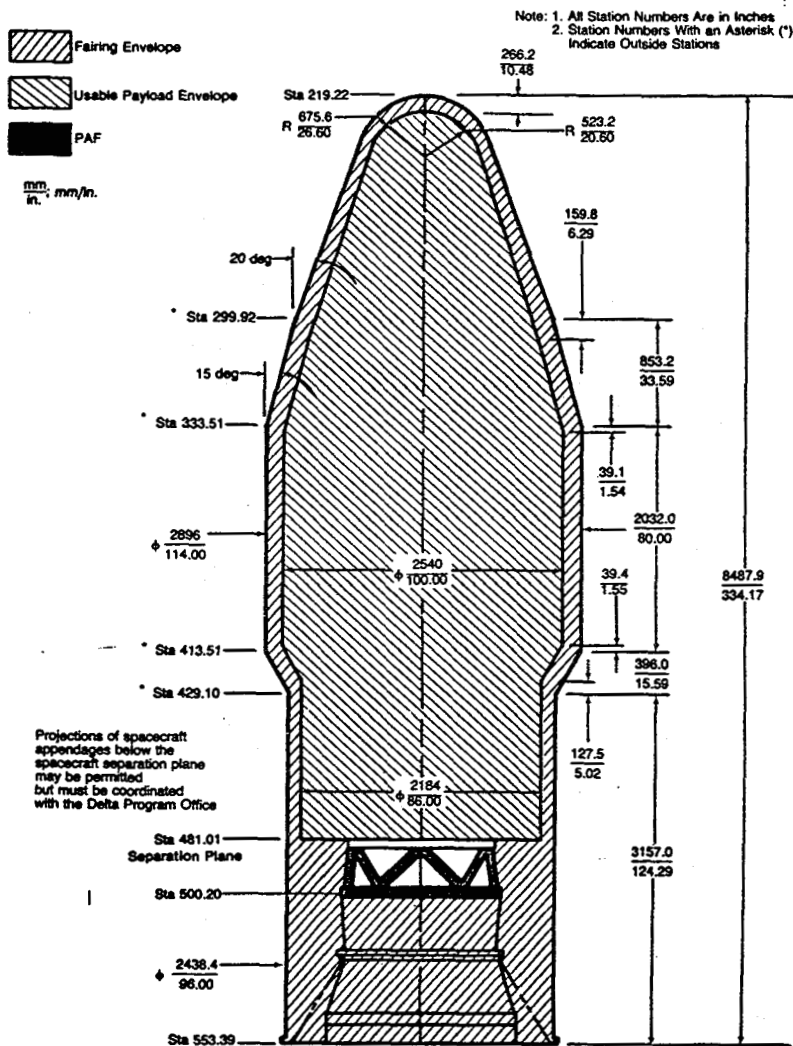
### **Availability:**

**Production Plans: Phase out from 69xx to 79xx series complete by 1992.**

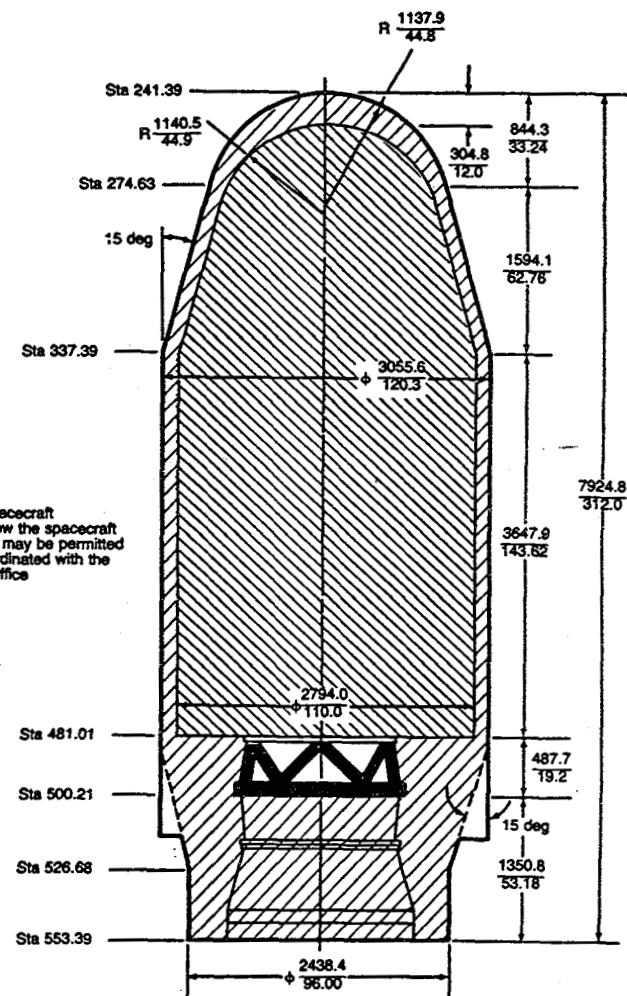
# Delta II 792X Configurations



# Delta II Payload Fairings (PAFs)



Projections of spacecraft appendages below the spacecraft separation plane may be permitted but must be coordinated with the Delta Program Office



## **Martin Marietta Titan II SLV Series**

### **Description of Titan II SLV Series derived from ex-ICBMs:**

**Two stage Titan II booster configuration using N2O4/Aerozine-50**

**IIG = No booster thrust augmentation, 3.0 meter Delta II PLF**

**IIS = 2 to 10 strap-on Graphite Epoxy Motors (GEMs)**

**III = Parallel configuration of two baseline boosters (1st stage only)  
attached to a baseline core (stages 1 & 2), 3.0 meter Delta II PLF**

**IIIL = Parallel configuration of two baseline boosters (1st stage only)  
attached to a Titan III (Commercial Titan) core using Titan II  
stage 1 & 2 engines, 13.1' x 34' PLF (4.0 x 10.4 meter PLF)**

### **Availability:**

**Number Remaining**

**41 (out of 55) unrefurbished, unmodified ICBMs**

**Expected Prod Run**

**Refurbish remainder of ICBM stock**

**Plans to produce revisions of the Titan II series**

# Titan II Series Configurations

## TITAN FAMILY



Basic

4,200 lbs Polar

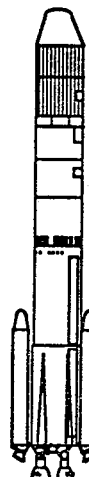
TII B



No Thrust Augmented

4,200 lbs Polar

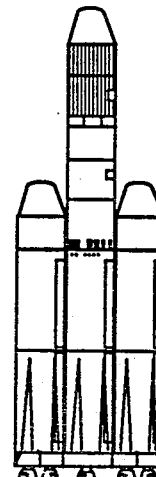
TII G



Solid Thrust Augmented

7,800 lbs Polar

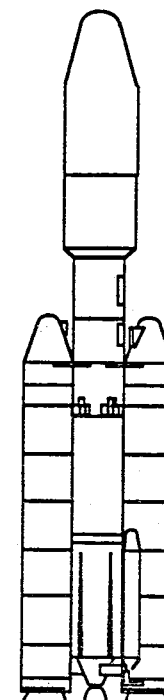
TII S



Liquid Thrust Augmented

15,500 lbs Polar

TII L/TIII L

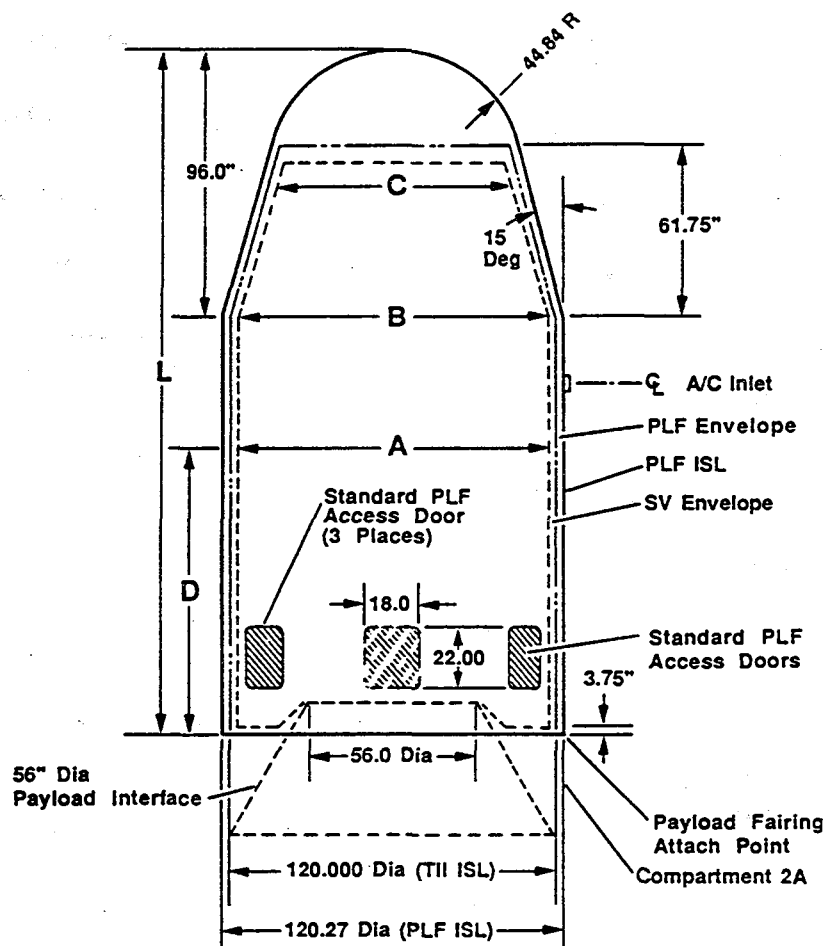


Solid Thrust Augmented

24,000 lbs Polar

TIII

# Titan II Payload Fairings (PAFs)



L, FT	Dimension, In.					Weight Lb *
	L	A	B	C	D	
20	240	111.7	111.7	78.9	144	1435
25	300	111.6	111.1	77.9	144	1650
30	360	111.5	110.3	77.1	144	2000

\* Weight Excludes Exterior Insulation, Acoustic Blankets and Standard Access Doors (Preliminary).

PAYLOAD FAIRING ENVELOPES

## General Dynamics Altas Series

### Description of Atlas Series ELVs:

LOX/RP-1 booster, one sustainer and two booster engines, 1.5 stage.

LOX/LH2 Centaur upper stage, two P&W RL-10 series engines, avionics.

Atlas II has longer tanks & more booster thrust. Atlas IIA has upgraded Centaur. Atlas IIAS has four Castor IVA solid rockets strapped to booster.

### Availability:

Atlas I	1990	7 remaining (committed)
Atlas II	1991	
Atlas IIA	1991	
Atlas IIAS	1993	



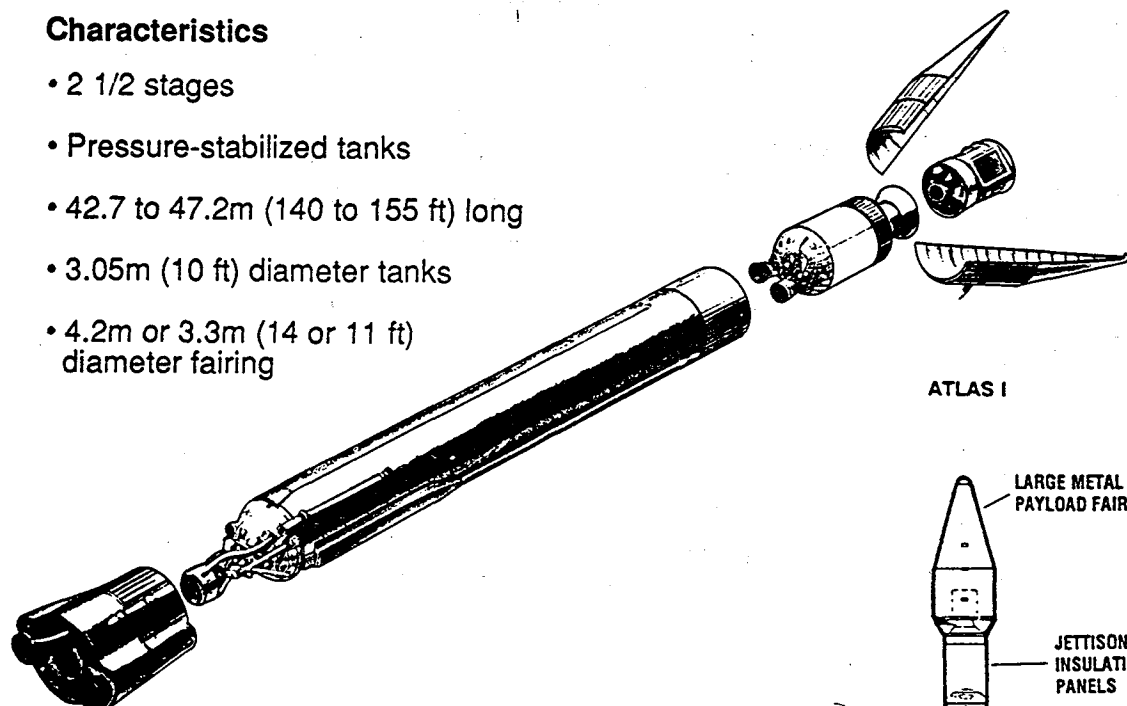
# Atlas II Series Configurations

GENERAL DYNAMICS  
Commercial Launch Services

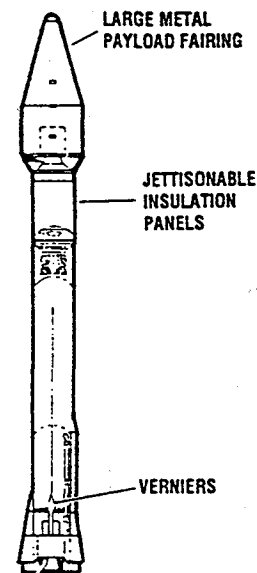
## ATLAS LAUNCH VEHICLE

### Characteristics

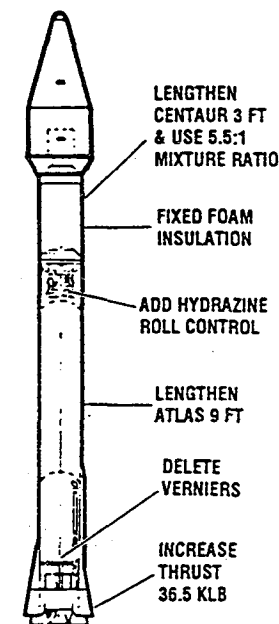
- 2 1/2 stages
- Pressure-stabilized tanks
- 42.7 to 47.2m (140 to 155 ft) long
- 3.05m (10 ft) diameter tanks
- 4.2m or 3.3m (14 or 11 ft) diameter fairing



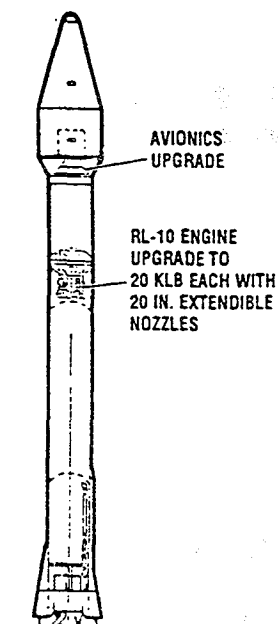
ATLAS I



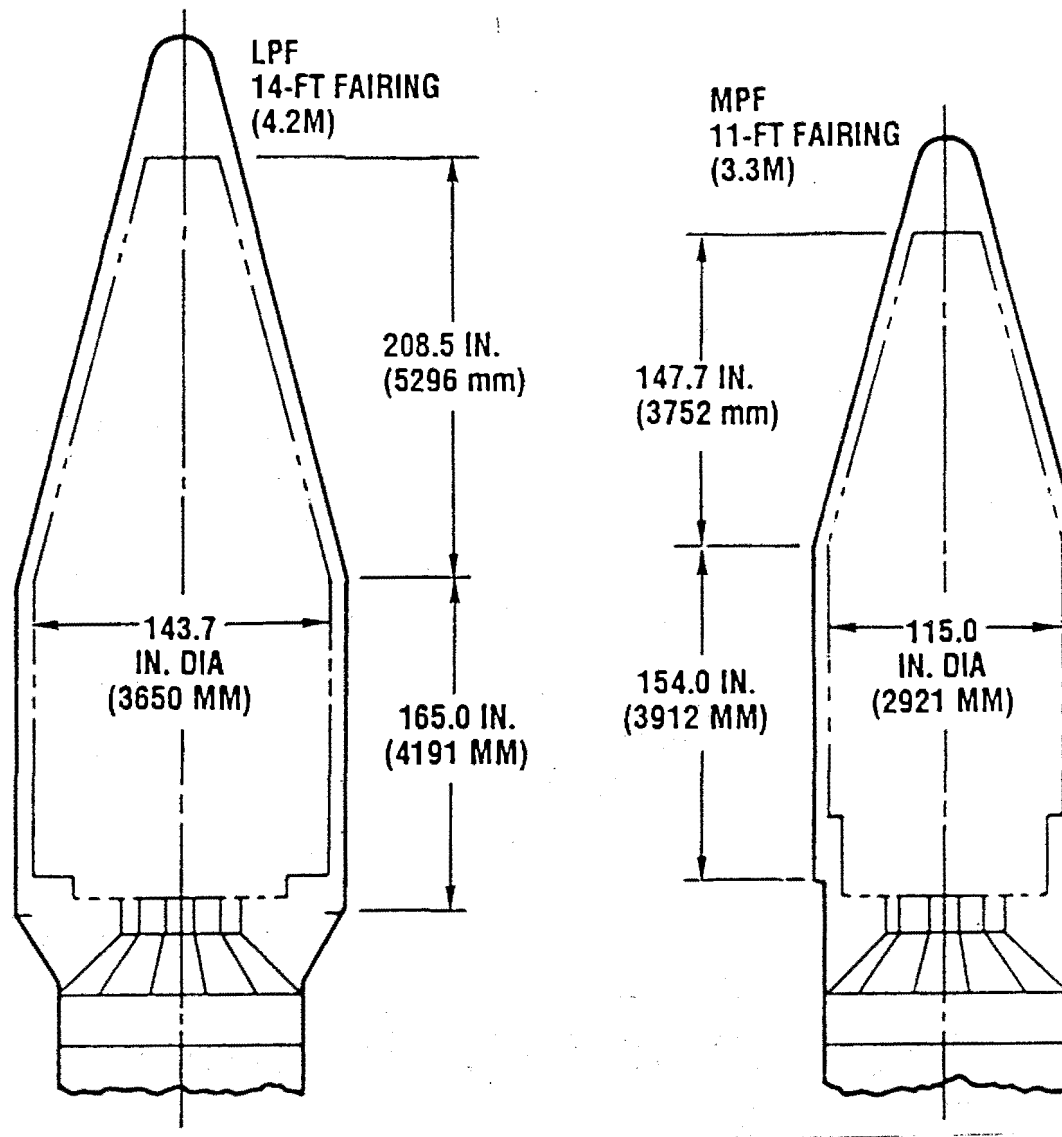
ATLAS II



ATLAS IIA



# Atlas II Payload Fairings (PAFs)



## Payload Performance to LEO

<b>PSW Performance (kg):</b>	<b>Delta II 7920</b>	<b>Titan IIS</b>
185 km/28.7/ESMC	5,040*	5,430
<b>Cost</b>	\$55 M	**\$35 M
<b>PSW Performance (kg):</b>	<b>Atlas II/IIA/IIAS</b>	<b>Titan IIL</b>
185 km/28.5/ESMC	6,600/7,050/8,600***	9,060
<b>Cost</b>	\$85/90/120 M	**\$47 M

\* 2.9m PLF

\*\* W/O integration costs

\*\*\* 4.2m (large) PLF